ORIGINAL ARTICLE

Prevalence of Pneumonia with Congenital Heart Disease in Children at District Dera Ismail Khan, Pakistan

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ABSTRACT
One of the more severe infections, pneumonia involves an infection of the lungs, more specifically the alveoli. It is a significant issue for public health and the main cause of sickness and mortality in children under five, particularly in underdeveloped nations. The purpose of the current study was to determine the prevalence of pneumonia with congenital heart disease (CHD) in children. In this study, there were 765 children were involved and among them, 245 children were infected with pneumonia. Among total of 360 male and 405 female children, 33.06 and 31.11%, respectively had pneumonia. 1-2 years child had severe pneumonia infection (39.80%) followed by 3-4 years (36.04%), 5-6 years (30.87%), 7-8 years (25.58%), and 9-10 years (19.81%). The highest pneumonia prevalence was seen in 1-2 years of age. Female child were highly infected with pneumonia as compared to male. Heart failure and murmurs were more prevalent in children with CHD. Factors significantly associated with pneumonia included: age below 6 months, lack of exclusive breastfeeding during the first six months, rural residence, severe acute malnutrition, not up-to-date for age immunization status, and exposure to cigarette smoke. Pneumonia was common in youngsters under the age of five. Addressing the associated factors could lower the prevalence of pneumonia because the majority of them are changeable and manageable.
Keywords: Pneumonia; Congenital heart disease; Prevalence; Risk factors; Pakistan

INTRODUCTION
Pneumonia or acute lower respiratory tract infection (ALRTI) is the leading cause of death in children. The majority of ALRTI cases occurred worldwide in underdeveloped countries or nations. In individuals who are predisposed, severe respiratory virus infections are typically followed by a dramatic rise in life-threatening cardiac problems (Khairy et al., 2010; Moons et al., 2010; Marelli et al., 2014; Diller et al., 2021). ARI causes about 1.9 million infant fatalities per annum in developing countries.

The most significant and prevalent predisposing factors for pneumonia are immune system diseases, such as those seen in severe congenital immune deficiencies, malnutrition, and acquired immune deficiencies (Owayed et al., 2000; Jat et al., 2022). Although early childhood indications of congenital problems in the small left-to-right shunts, such as recurrent LRTI and failure to thrive, can exist, it is still important to screen this population of kids for CHD. Early and correct diagnosis of CHD in children presenting with recurrent LRTI necessitates rapid, efficient, and systematic techniques, including complete clinical examination and collecting of a comprehensive medical history (Sadoh and Osarogiagbon, 2013; Sufahani and Ismail, 2014; Nirmolia et al., 2018).

One of the most frequent cardiac consequences of pneumonia in adults is congestive heart failure (CHF), which increases the risk of morbidity and mortality. Evidence suggested that certain factors were linked to the occurrence of pneumonia in children under the age of five. Child, maternal, environmental, healthcare access, crowded living conditions, indoor air pollution from cooking with charcoal, holding a child while cooking, and cooking in the main house are all potential contributing factors. Co-occurring illnesses like HIV/AIDS, malaria, breastfeeding duration, just breastfeeding, and the child's nutritional health. Identification of potential risk factors for multidrug-resistant organisms or atypical infections is critical during initial evaluation of a patient presenting to the community with pneumonia. In order to stop the spread of paediatric pneumonia, parents, the government, and medical facilities must take serious preventive measures, such as getting vaccinated against Hepatitis B, eating a healthy diet, providing accessible, hygienic indoor stoves, and promoting excellent cleanliness in crowded houses. However, nothing is known about paediatric CHF and pneumonia in children. Therefore, the purpose of this study was to examine the incidence/prevalence of pneumonia with congenital heart disease in children and risk factors associated with pneumonia.

MATERIALS AND METHODS
Study Area, period and study design: A cross-sectional study was conducted in district Dera Ismail Khan, Khyber Pakhtunkhwa (KPK), Pakistan which is located on Indus River with elevation, latitude and longitude coordinates 165 m, 31.831482, and 70.911598, respectively. It is consider the 37th largest city of KPK.

Source and Study Population: Three tehsils of Dera Ismail Khan were visited randomly to determine the prevalence of pneumonia in children from July 2019-July 2020. Total 765 children of age between 1-10 years were involved in this study. An in-person interview at the participant's home with a pretested, semi-structured questionnaire was used to get the data. To preserve uniformity, the questionnaire was first written in English, then translated into the local tongue for understanding the participants.

Statistical analysis: The data were then exported to the version 20.00 of the Statistical Package for the Social Sciences (SPSS) for data validation, cleaning, and analysis. To describe the study population in regard to dependent and independent variables, descriptive statistics were used.

RESULTS AND DISCUSSION
In order to ascertain the prevalence and risk factors for pneumonia in kids living in the district's urban and rural areas, the current study was carried out in Dera Ismail Khan. In total, 765 people took part in this study, and information was gathered through posing questions to child moms. Children of all ages participated in this study. Their parents were educated up to the University level. The moms of mostly children were involved in teaching profession (49.41%) followed by farmer (39.21%) and traders (11.37%) (Table 1).

Table 1: Demographic characteristics of participants in the study area.

Variables	Frequency (n=)	Percentage
Sex of child		
Male	360	47.05
Female	405	52.94
Total	765	100
Age of child		
1-2 year	209	27.32
3-4 year	172	22.48
5-6 year	149	19.47
7-8 year	129	16.86
9-10 year	106	13.85

Total	765	100
Birth weight		
1-2 kg	309	40.39
3-4 kg	267	34.9
> 4 kg	189	24.7
Total	765	100
Location		
Urban	342	44.7
Rural	423	55.29
Total	765	100
Maternal occupation		
Farmer	300	39.21
Teacher	378	49.41
Trader	87	11.37
Total	765	100
Maternal education		
Illiterate	144	18.82
Primary	189	24.7
Middle	165	21.56
Matric	114	14.9
FSC	104	13.59
University	49	6.4
Total	765	100

Table 2: Risk factors associated with pneumonia.

Variables	Frequency (n=765)	Percentage
Medical characteristics		
Exclusive breast feeding for 6 month		
Yes	302	39.47
No	463	60.52
Total	765	100
Nutritional status		
Severe acute malnutrition	175	22.87
Moderate acute malnutrition	213	27.84
Normal malnutrition	377	49.28
Total	765	100
Comorbidity		
Yes	390	51.08
No	375	49.01
Total	765	100
Environmental Characteristics		
Parental/care taker smoking		
Yes	404	52.81
No	361	47.18
Total	765	100
Place of cooking		
Outdoor	351	45.88
Indoor	414	54.11
Total	765	100

There were different risk factors associated with pneumonia such as age, birth place, religion, immunization status, parental education, parental smoking, exclusive breast feeding and having comorbidity, and nutritional status (Table 2). In the current study, it was observed that children highly affected with pneumonia whose parents were involved in smoking or cigarettes. Children who were exposed to cigarette smoke had a 3 times greater chance of developing pneumonia than those who stayed in a cigarette-smoke-free environment.

Table 3: Sex and age wise prevalence of pneumonia in child of study area.

Variables	N	Infected child	Non-infected child	Prevalence (%)	p-value
Sex of child					
Male	360	119	241	33.06%	0.352
Female	405	126	279	31.11%	
Age of child					
1-2 year	209	83	126	39.8%	
3-4 year	172	62	110	36.04%	
5-6 year	149	46	103	30.87%	0.832
7-8 year	129	33	96	25.58%	
9-10 year	106	21	85	19.81%	
Overall/total	32.03%				

Out of 360 male and 405 female children, 33.06 and 31.11%, respectively had pneumonia. It was recorded that 1-2 years child had severe pneumonia infection (39.80%) followed by 3-4 years (36.04%), 5-6 years (30.87%), 7-8 years (25.58%), and 9-10 years (19.81%) as given in table 3. The highest pneumonia prevalence was seen in 1-2 years of age. Female child were highly infected with pneumonia as compared to male. Our sex wise findings are in line with the results of Kiconco et al. (2021), who studied risk factors and prevalence of pneumonia under five age children in Uganda. Mothers were found to have poor hand cleanliness, poor feeding habits, and inadequate awareness of the symptoms and signs of pneumonia. In the current survey, 34% of homes had too many people living in them, with an average family size of 5.50 and insufficient ventilation.
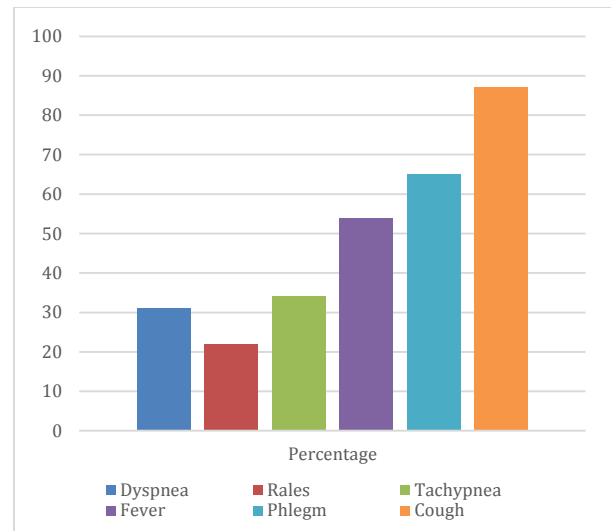

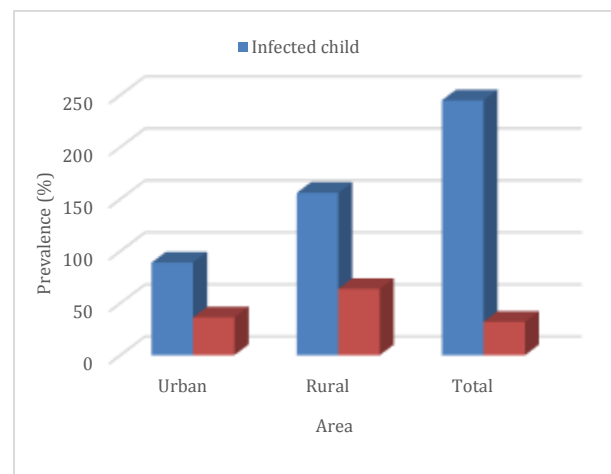Figure 1: Symptoms of pneumonia with percentage

Figure 2: Area wise prevalence (%) of pneumonia

The overall prevalence of pneumonia was recorded 32.03% in the present study while 25.6% and 53.7% recorded by other researchers from different countries like Uganda and Kenya (Uwemedimo et al., 2018; Biruk et al., 2020). Our overall pneumonia prevalence is less than the findings of other researchers (Jeffrey et al., 2007; Enarson et al., 2015). This difference may be due to difference in sample size, location and age differences. The main symptoms of pneumonia which recorded in this study were cough, fever, rales, tachypnea, phlegm, and dyspnea. The percentage of each symptom is shown

in figure 1. It was recorded in this study that children living in rural areas were highly infected with various diseases especially pneumonia than children residing in urban areas as shown in figure 2. The high diseases prevalence in rural areas showed the lack of hospital facility in these areas or lack of knowledge, awareness and practices to moms. Majority of childer had cough followed by Phlegm, fever, tachypnea, dyspnea and rales. Wang et al. (2013) and Gothankar et al. (2018) had reported the similar symptoms of pneumonia in children. They conducted a study in china and India. The prevalence of the CHDs is given in table 4.

Table 4: Prevalence of Congenital heart disease (CHD) among pneumonia patients.

Type of CHD	Number	%
Mitral Stenosis	2	10
Tricuspid atresia	1	5
Ventricular septal defect	10	50
Patent ductus arteriosus	3	15
Truncus arteriosus	4	20
Total	20	100

CONCLUSION

One of the most hazardous illnesses for kids under 12 is pneumonia. Numerous factors affect the variations in paediatric pneumonia infection rates. Regardless of their socioeconomic situation, children can get pneumonia; nevertheless, the risk is increased in young infants, underweight kids, and not just them. Some of the risk factors for pneumonia include crowded living conditions and indoor air pollution. The interior becomes damper due to overcrowding and poor ventilation, which fosters the growth of mould, respiratory infections, and mites. They all play established roles in the aetiology of respiratory diseases in the lungs of children. The comorbidity were chronic kidney disease, diabetes mellitus, cystic fibrosis, chronic obstructive pulmonary disease, asthma and lung cancer in the children.

REFERENCES

1. Biruk B, Melaku B, Ayelign M, Mesfin W, Molla A, Bimerew B, A. et al. Prevalenc of pneumonia and its associated factors among under-five children in East Africa: a systematic review and meta-analysis. BMC Pediatr 2020. 20, 254.
2. Diller, G. P., Enders, D., Lammers, A. E., Orwat, S., Schmidt, R., Radke, R. M., ... & Baumgartner, H. (2021). Mortality and morbidity in patients with congenital heart disease hospitalised for viral pneumonia. Heart, 107(13), 1069-1076.
3. Enarson P M, Gie R P, Mwansambo C C, Chalira A E. potentially modifiable factors associated with Death of Infants and Children with Severe Pneumonia Routinely Managed in District Hospitals in Malawi. PLoS One 2015; 10(8): 1–13
4. Jat, N. K., Bhagwani, D. K., Bhutani, N., Sharma, U., Sharma, R., & Gupta, R. (2022). Assessment of the prevalence of congenital heart disease in children with pneumonia in tertiary care hospital: A cross-sectional study. Annals of Medicine and Surgery, 73, 103111.
5. Jeffrey A T, Ayub S M, Norbert O, Stewart K, Robert B, Daniel R. F. The Epidemiology of Hospitalized Pneumonia in Rural Kenya: The Potential of Surveillance Data in Setting Public Health Priorities. International Journal of Infectious Diseases 2007; (11): 536—543
6. Khairy, P., Ionescu-Ittu, R., Mackie, A. S., Abrahamowicz, M., Pilote, L., & Marelli, A. J. (2010). Changing mortality in congenital heart disease. Journal of the American College of Cardiology, 56(14), 1149-1157.
7. Kiconco, G., Turyasiima, M., Ndamira, A., Yamile, O. A., Egesa, W. I., Ndiwimana, M., & Maren, M. B. (2021). Prevalence and associated factors of pneumonia among under-fives with acute respiratory symptoms: a cross sectional study at a Teaching Hospital in Bushenyi District, Western Uganda. African Health Sciences, 21(4), 1701-10.
8. Marelli, A. J., Ionescu-Ittu, R., Mackie, A. S., Guo, L., Dendukuri, N., & Kaouache, M. (2014). Lifetime prevalence of congenital heart disease in the general population from 2000 to 2010. Circulation, 130(9), 749-756.
9. Moons, P., Bovijn, L., Budts, W., Belmans, A., & Gewillig, M. (2010). Temporal trends in survival to adulthood among patients born with congenital heart disease from 1970 to 1992 in Belgium. Circulation, 122(22), 2264-2272.
10. Nirmolia, N., Mahanta, T. G., Boruah, M., Rasaily, R., Kotoky, R. P., & Bora, R. (2018). Prevalence and risk factors of pneumonia in under five children living in slums of Dibrugarh town. Clinical Epidemiology and Global Health, 6(1), 1-4.
11. Owayed, A. F., Campbell, D. M., & Wang, E. E. (2000). Underlying causes of recurrent pneumonia in children. Archives of pediatrics & adolescent medicine, 154(2), 190-194.
12. Sadoh, W. E., & Osarogiagbon, W. O. (2013). Underlying congenital heart disease in Nigerian children with pneumonia. African health sciences, 13(3), 607-612.
13. Singh, P. K., Chaudhuri, P. K., & Chaudhary, A. K. (2017). Incidence of congenital heart disease in children with recurrent respiratory tract infection in tertiary hospital. IOSR J Dent Med Sci, 16(9), 42-4.
14. Sufahani, S., & Ismail, Z. (2014). The statistical analysis of the prevalence of pneumonia for children age 12 in west Malaysian hospital. Applied Mathematical Sciences, 8(113-116), 5673-5680.
15. Uwemedimo O, Lewis T, Essien E, Grace J. C, Humphreys N, Margaret E.K, et.al. Distribution and Determinants of Pneumonia Diagnosis Using Integrated Management of Childhood Illness Guidelines: A Nationally Representative Study in Malawi. BMJ Glob Health; 2018; 3: E000506. Doi: 10.1136/ Bmjgh-2017-000506.
16. Wang, X. F., Liu, J. P., Shen, K. L., Ma, R., Cui, Z. Z., Deng, L., ... & Wang, Z. (2013). A cross-sectional study of the clinical characteristics of hospitalized children with community-acquired pneumonia in eight eastern cities in China. BMC Complementary and Alternative Medicine, 13(1), 1-10.